Ancillary Water Quality, Physical Habitat, and Biological Data From the Juniata Subbasin

Publication No. 179 *January 1997*

Susquehanna River Basin Commission
1721 N. Front Street
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ANCILLARY WATER QUALITY, PHYSICAL HABITAT, AND BIOLOGICAL DATA FROM THE JUNIATA SUBBASIN

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This report is prepared in cooperation with Pennsylvania Department of Environmental Protection, Bureau of Water Quality Management under grant ME94696.

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The Susquehanna River Basin Commission was created as an independent agency by a federal-interstate compact* among the states of Maryland, New York, Commonwealth of Pennsylvania, and the federal government. In creating the Commission, the Congress and state legislatures formally recognized the water resources of the Susquehanna River Basin as a regional asset vested with local, state, and national interests for which all the parties share responsibility. As the single federal-interstate water resources agency with basinwide authority, the Commission's goal is to effect coordinated planning, conservation, management, utilization, development and control of basin water resources among the government and private sectors.

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by Scott W. Bollinger
Robert E. Edwards
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INTRODUCTION

During the summer of 1995, the Susquehanna River Basin Commission (SRBC) conducted an assessment of the water quality and biological conditions of the streams and rivers in the Juniata Subbasin (McGarrell, 1997). The project was funded by the Pennsylvania Department of Environmental Protection (Pa. DEP), Bureau of Water Quality Management under Grant ME94696. During the field data collection phase of the project, SRBC staff collected additional field data requested by the Pa. DEP to support several of the department's ongoing water quality management programs. The data include: (1) physico-chemical water quality, physical habitat, and biological information collected immediately upstream and downstream of 20 randomly selected permitted wastewater discharges; (2) chlorine demand data collected at 67 sample sites; and (3) fish community data from 15 Trout Stocked Fisheries (TSF).

DATA FROM SELECTED POINT SOURCE DISCHARGES

Methods

Field data were collected during a period of little or no precipitation when streamflows were maintained primarily by baseflow. Twenty permitted discharges (10 industrial facilities and 10 sewage treatment plants) were sampled between July 20 and September 12, 1995 (Table 1). Nineteen of these discharges were located in the Juniata Subbasin, and one was in the Lower Susquehanna Subbasin. Physical habitat and chemical water quality conditions were documented, and benthic macroinvertebrate and chemical water quality samples were collected for laboratory analysis immediately upstream of the wastewater outfall and downstream of the outfall within the mixing zone.

Chemical water quality data

Field water quality measurements included water temperature, dissolved oxygen, conductivity, pH, alkalinity, and acidity. Dissolved oxygen was measured using a YSI dissolved oxygen meter or by the Winkler titration method. Conductivity was measured using a Beckman Solubridge meter. An Orion Model 399a meter was used to measure pH. Alkalinity was measured by titrating a known volume of sample water to pH 4.5 with 0.2N H2SO4. Acidity was measured by titrating a known volume of sample water to pH 8.3 with 0.2N NaOH.

Approximately 2 liters of water from each site were collected for laboratory analysis. Laboratory samples consisted of two 500 ml bottles for nutrient analysis (one filtered and one unfiltered), and two 500 ml bottles for metal analysis (also one filtered and one unfiltered). Sample water was filtered through a cellulose nitrate filter with a 0.45 um pore size. The samples for metal analyses were acidified to pH 2, or less, with nitric acid. All samples were chilled on ice and shipped within 24 hours to the

Table 1. Point Source Discharge Sample Site Locations

Sample Site		Sample Site Location	County
BEAV		Beaverdam Branch at Conrail Division Headquarters, Hollidaysburg Boro., Pa.	Blair
	BEAV(U)	Approximately 50 ft. upstream of downstream end of parking lot	
	BEAV(D)	Approximately 100 ft below railroad bridge	
BEAV 04.0		Beaverdam Branch at Small Tube Products Co. Inc., near Holidaysburg, Pa.	Blair
	BEAV 04.0(U)	Immediately upstream of Small Tube Products, Inc. discharge	
	BEAV 04.0(D)	Downstream of Small Tube Products, Inc. discharge, but upstream of Blair Gap Run	
BLGP 00.4		Blair Gap Run at Duncansville STP, Duncansville, Pa.	Blair
	BLGP 00.4(U)	Immediately upstream of STP outfall	
	BLGP 00.4(D)	Approximately 100 ft. downstream of STP outfall	
BLLG 00.9		Blacklog Creek at Orbisonia-Rockhill Jt. M.A., Orbisonia, Pa.	Huntingdon
	BLLG 00.9(U)	Approximately 100 ft. upstream of STP outfall	
	BLLG 00.9(D)	Approximately 300 ft. downstream of STP outfall	
BSPR		Boiling Springs Run at General Refractories Co., Greenfield Twp., Pa.	Blair
	BSPR(U)	Approximately 200 ft. upstream of S.R. 3006 bridge	
	BSPR(D)	Approximately 200 ft. downstream of S.R. 3006 bridge	
DELA 00.2		Delaware Creek at Thompsontown M.A., Thompsontown, Pa.	Juniata
	DELA 00.2(U)	Approximately 100 ft. upstream of STP outfall	
	DELA 00.2(D)	Approximately 50 ft. downstream of STP outfall	
DUNN 09.9		Dunning Creek at E. St. Clair Twp. M.A. STP Discharge, Fishertown, Pa.	Bedford
	DUNN 09.9(U)	Approximately 200 ft. upstream of STP outfall	
	DUNN 09.9(D)	Just upstream of tributary at Salis, Pa.	
FRNK 01.6		Frankstown Branch Juniata River at Alexandria -Porter Twp. J.A. STP, Porter Twp., Pa.	Huntingdon
	FRNK 01.6(U)	Immediately upstream of STP outfall	
	FRNK 01.6(D)	Approximately 100 ft. downstream of STP outfall	
FRNK 38.1		Frankstown Branch Juniata River at Appleton Papers Inc., Brooks Mill, Pa.	Blair
	FRNK 38.1(U)	Approximately 200 ft. upstream of Appleton Paper's wastewater outfall	
	FRNK 38.1(D)	Approximately 200 ft downstream of Appleton Paper's wastewater outfall	
FRNK		Frankstown Branch Juniata River at Greenfield Twp. M.A., Claysburg, Pa.	Blair
	FRNK(U)	Approximately 100 ft. upstream of STP outfall	
	FRNK(D)	Approximately 100 ft. downstream of STP outfall	
HALT		Halter Creek at New Enterprise Stone and Lime, Taylor Twp., Pa.	Blair
	HALT(U)	Approximately 100 ft. upstream of New Enterprise outfall	
	HALT(D)	Approximately 100 ft. downstream of New Enterprise outfall	
KISH		Kishacoquillas Creek at Burnham Boro Auth. STP, Burnham, Pa.	Mifflin
	KISH(U)	Approximately 125 ft. upstream of Burnham Boro. STP outfall	
	KISH(D)	Approximately 125 ft. downstream of Burnham Boro STP outfall	
KISH 05.5		Kishacoquillas Creek at Standard Steel, Burnham, Pa.	Mifflin
	KISH 05.5(U)	Immediately upstream of bridge located upstream of Standard Steel	
	KISH 05.5(D)	Approximately 125 ft. upstream of Burnham Boro. STP outfall	
LJUN 15.0		Little Juniata River at Tyrone STP, Tyrone, Pa.	Blair
	LJUN 15.0(U)	Immediately upstream of Tyrone STP outfall	
	LJUN 15.0(D)	Approximately 250 ft. downstream of STP outfall	
LJUN 19.4		Little Juniata River at PPG Works #27, Antis Twp., Pa.	Blair
	LJUN 19.4(U)	Immediately upstream of PPG outfall	
	LJUN 19.4(D)	Approximately 100 ft. downstream of PPG outfall	
LJUN 29.6		Little Juniata River at Altoona City Authority East STP, Altoona, Pa.	Blair
	LJUN 29.6(U)	Immediately upstream of Altoona East STP outfall	
	LJUN 29.6(D)	Approximately 200 ft. downstream of Altoon East STP outfall	
RAYS 42.8		Raystown Branch Juniata River at Saxton STP, Saxton, Pa.	Bedford
	RAYS 42.8(U)	Immediately upstream of Saxton STP outfall	
	RAYS 42.8(D)	Approximately 150 ft. downstream of Saxton STP outfall	

Table 1. Point Source Discharge Sample Site Locations—Continued

Sample Site		Sample Site Location	County
RAYS		Raystown Branch Juniata River at Hedstrom Inc., Bedford, Pa.	Bedford
	RAYS(U)	Immediately upstream of Rt. 30 (east) Bridge	
	RAYS(D)	Approximately 15 ft. downstream of Hedstrom Inc. discharge	
SHUP		Shoup Run at Dudley-Barnettstown W.A. Treatment Facility, Carbon Twp., Pa.	Huntingdon
	SHUP(U)	Immediately upstream of Dudley-Barnettstown W.A.	
	SHUP(D)	Approximately 100 ft. downstream of Dudley-Barnettstown W.A. outfall	
TRTR*		Trout Run at Shippensburg W.A. Treatment Facility, Roxbury, Pa.	Franklin
	TRTR(U)	Approximately 250 ft. upstream of Shippensburg W.A. outfall	
	TRTR(D)	Approximately 100 ft. downstream of Shippensburg W.A. outfall	

* Not in Juniata Subbasin

Pa. DEP, Bureau of Laboratories in Harrisburg, Pa.

Physical habitat data

Physical habitat conditions at each sample station were assessed using a slightly modified version of the habitat assessment procedure outlined by Plafkin and others (1989). A total of 11 habitat parameters were field-evaluated at each station and used to calculate a site-specific Habitat Assessment Score. Habitat parameters were identified as either primary, secondary, or tertiary parameters, based on their contribution to habitat quality. Primary parameters, stream habitat features that have the greatest direct influence on the structure of aquatic communities, were evaluated on a scale of 0-20 and included the characterization of the stream bottom substrate and instream cover, embeddedness, and velocity/depth diversity. Secondary parameters included stream channel morphology characteristics, and were scored on a scale of 0-15. Tertiary parameters characterized riparian and bank conditions, and were scored on a scale of 0-10. The criteria used to evaluate habitat parameters are summarized in Table 2.

Biological data

Macroinvertebrate communities were sampled using a 0.3-meter-wide D-frame net to collect organisms dislodged from riffle areas by physical agitation of the streambed. Two 0.3-square-meter areas of the streambed were sampled at each site: one area of high velocity, and one of lower velocity. The two samples were composited and preserved in a solution of isopropyl alcohol and glycerin for laboratory analysis. In the laboratory, composite samples were sorted into 100-organism subsamples, using a gridded pan and a random numbers table. The organisms contained in the subsamples were identified to genus (except for Chironomidae) and enumerated.

Results

Chemical water quality data are summarized in Appendix A, Table A1.

Physical habitat data are summarized in Appendix A, Table A2.

Biological data are summarized in Appendix A, Table A3.

CHLORINE DEMAND DATA

Methods

Chlorine demand data were collected at 67 sample sites in the Juniata Subbasin between July 17 and September 12, 1995 (Table 3). Chlorine demand was determined in the field using a LaMotte Model DC1100 Digital Chlorine Colorimeter. At each sample site, a minimum of 1 liter of stream water was collected and analyzed for background concentrations of chlorine. The sample was divided into two 500 ml portions, and each portion was dosed with a known chlorine concentration. Chlorine residual concentrations were measured at 10 minutes and 15 minutes after the initial dose. The 15-minute result was used to determine the chlorine demand of the stream by calculating the difference between the initial chlorine concentration (background residual chlorine plus dose at time = 0 minutes) and the remaining chlorine concentration (time = 15 minutes). Chlorine demand test results were considered valid if the chlorine demand values of both 500 ml portions at 15 minutes were within 20 percent of the average result.

Results

Chlorine demand data are summarized in Appendix B.

Table 2. Criteria Used to Evaluate Physical Habitat Parameters

Habitat Parameter	Excellent	Good	Fair	Poor
1. **Bottom Substrate**	Greater than 50% cobble, gravel, submerged logs, undercut banks, or other stable habitat **(16-20)**	30-50% cobble, gravel, or other stable habitat. Adequate habitat. **(11-15)**	10-30% cobble, gravel, or other stable habitat. Habitat availability is less than desirable. **(6-10)**	Less than 10% cobble, gravel, or other stable habitat. Lack of habitat is obvious. **(0-5)**
2. **Embeddedness** (a)	Larger substrate particles (e.g., gravel, cobble, boulders) are between 0 and 25% surrounded by fine sediment. **(16-20)**	Larger substrate particles (e.g., gravel, cobble, boulders) are between 25 and 50% surrounded by fine sediment. **(11-15)**	Larger substrate particles (e.g., gravel, cobble, boulders) are between 50 and 75% surrounded by fine sediment. **(6-10)**	Larger substrate particles (e.g., gravel, cobble, boulders) are over 75% surrounded by fine sediment. **(0-5)**
3. **Velocity/Depth Diversity**	Four habitat categories consisting of slow (<1.0 ft/s), deep (>1.5 ft); slow, shallow (<1.5 ft); fast (> 1.0 ft/s), deep; fast, shallow habitats are all present. **(16-20)**	Only 3 of the 4 habitat categories are present. **(11-15)**	Only 2 of the 4 habitat categories are present. **(6-10)**	Dominated by 1 velocity/depth category (usually pools). **(0-5)**
4. **Pool/Riffle Ratio (or Run/Bend)**	Distance between riffles divided by mean wetted width equals 5-7. Stream contains a variety of habitats including deep riffles and pools. **(12-15)**	Distance between riffles divided by mean wetted width equals 7-15. Adequate depth in pools and riffles. **(8-11)**	Distance between riffles divided by mean wetted width equals 15-25. Stream contains occasional riffles. **(4-7)**	Distance between riffles divided by mean wetted width >25. Stream is essentially straight with all flat water or shallow riffle. Poor habitat. **(0-3)**
5. **Pool Quality** (b)	Pool habitat contains both deep(>1.5 ft) and shallow areas (<1.5 ft) with complex cover and/or depth greater than 5 ft. **(12-15)**	Pool habitat contains both deep(>1.5 ft) and shallow (<1.5 ft) areas with some cover present. **(8-11)**	Pool habitat consists primarily of shallow (<1.5 ft) areas with little cover. **(4-7)**	Pool habitat rare with maximum depth <0.5 ft, or pool habitat completely absent. **(0-3)**

Table 2. Criteria Used to Evaluate Physical Habitat Parameters—Continued

Habitat Parameter	Excellent	Good	Fair	Poor
6. **Riffle/Run Quality** (c)	Riffle/run depth generally >8 in. and consisting of stable substrate materials and a variety of current velocities. **(12-15)**	Riffle/run depth generally 4-8 in. and with a variety of current velocities. **(8-11)**	Riffle/run depth generally 1-4 in.; primarily a single current velocity. **(4-7)**	Riffle/run depth <1 in.; or riffle/run substrates concreted. **(0-3)**
7. **Channel Alteration** (d)	Little or no enlargement of islands or point bars, and/or no channelization. **(12-15)**	Some new increase in bar formation, mostly from coarse gravel; and/or some channelization present. **(8-11)**	Moderate deposition of new gravel, coarse sand on old and new bars; pools partially filled with silt; and/or embankments on both banks. **(4-7)**	Heavy deposits of fine material, increased bar development; most pools filled with silt; and/or extensive channelization. **(0-3)**
8. **Upper and Lower Streambank Erosion** (e)	Stable. No evidence of erosion or of bank failure. Side slopes generally <30%. Little potential for future problems. **(9-10)**	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. **(6-8)**	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% in some areas. High erosion potential during extreme high flow. **(3-5)**	Unstable. Many eroded areas. Side slopes >60% common. "Raw" areas frequent along straight sections and bends. **(0-2)**
9 **Upper and Lower Streambank Stability** (e)	Over 80% of the streambank surface is covered by vegetation or boulders and cobble. **(9-10)**	50-79% of the streambank surface is covered by vegetation, gravel, or larger material. **(6-8)**	25-49% of the streambank surface is covered by vegetation, gravel, or larger material. **(3-5)**	Less than 25% of the streambank surface is covered by vegetation, gravel, or larger material. **(0-2)**
10. **Streamside Vegetative Cover** ***(Both Banks)***	Dominant vegetation that provides stream-shading, escape cover, and/or refuge for fish within the bankfull stream channel is shrub. **(9-10)**	Dominant vegetation that provides stream shading, escape cover, and/or refuge for fish within the bankfull stream channel is trees **(6-8)**	Dominant vegetation that provides stream-shading, escape cover, and/or refuge for fish within the bankfull stream channel is forbs and grasses. **(3-5)**	Over 50% of the streambank has no vegetation and dominanat material is soil, rock, bridge materials, culverts, or mine tailings. **(0-2)**

Table 2. Criteria Used to Evaluate Physical Habitat Parameters—Continued

Habitat Parameter	Excellent	Good	Fair	Poor
11. Forested Riparian Buffer Zone Width (f) ***(Least Forested Bank)***	Riparian area consists of all three zones of vegetation, Zones 1-3. (see zone descriptions (e)) **(9-10)**	Riparian area consists of Zones 1 and 2. **(6-8)**	Riparian area is limited primarily to Zone 1. Zone 2 may be forested but is subject to disturbance (e.g. grazing, intensive forestry practices, roads). **(3-5)**	Riparian area lacks Zone 1 with or without Zones 2 and/or 3. **(0-2)**

(a) Embeddedness — The degree to which the substrate materials that serve as habitat for benthic macroinvertebrates and for fish spawning and egg incubation (predominantly cobble and/or gravel) are surrounded by fine sediment. Embeddedness is evaluated with respect to the suitability of these substrate materials as habitat for macroinvertebrates and fish by providing shelter from the current and predators, and by providing egg deposition and incubation sites.

(b) Pool Quality — Rated based on the variety and spatial complexity of slow- or still-water habitat within the sample segment. It should be noted that even in high- gradient segments, functionally important slow-water habitat may exist in the form of plunge-pools and/or larger eddies. Within a category, higher scores are assigned to segments which have undercut banks, woody debris, or other types of cover for fish.

(c) Riffle/Run Quality — Rated based on the depth, complexity, and functional importance of riffle/run habitat in the segment, with highest scores assigned to segments dominated by deeper riffle/run areas, stable substrates, and a variety of current velocities.

(d) Channel Alteration — A measure of large-scale changes in the shape of the stream channel. Channel alteration includes: concrete channels, artificial embankments, obvious straightening of the natural channel, rip-rap, or other structures, as well as recent sediment bar development. Sediment bars typically form on the inside of bends, below channel constrictions, and where stream gradient decreases. Bars tend to increase in depth and length with continued watershed disturbance. Ratings for this parameter are based on the presence of artificial structures as well as the existence, extent, and coarseness of sediment bars, which indicate the degree of flow fluctuations and substrate stability.

(e) Upper and Lower Streambank Erosion and Stability — These parameters include the concurrent assessment of both the upper and lower banks. The upper bank is the land area from the break in the general slope of the surrounding land to the top of the bankfull channel. The lower bank is the intermittently submerged portion of the stream cross section from the top of the bankfull channel to the existing water-line.

(f) Forested Riparian Buffer Zone Width

Zone 1: a 15 ft wide buffer of essentially undisturbed forest located immediately adjacent to the stream.

Zone 2: a 100 ft wide buffer of forest, located adjacent to Zone 1, which may be subject to non-intensive forest management practices.

Zone 3: a 20 ft wide buffer of vegetation, located adjacent to Zone 2, that provides sediment filtering and promotes the formation of sheet flow of runoff into Zone 2. Zone 3 may be composed of trees, shrubs, and/or dense grasses and forbs, which are subject to haying and grazing, as long as vegetation is maintained in vigorous condition.

Source: Modified from Plafkin and others, 1989.

Table 3. Chlorine Demand Sample Site Locations

Sample Site	Location
AUGH 00.4	Aughwick Creek upstream of Rte. 103/1303 Bridge, near Kisler, Pa.
AUGH 17.2	Aughwick Creek downstream of Three Springs Creek
BEAV 00.1	Beaverdam Branch near Hollidaysburg, Pa.
BEAV	Beaverdam Branch upstream of Conrail Division Headquarters, Hollidaysburg Boro., Pa.
BEAV 04.0	Beaverdam Branch upstream of Small Tube Products Co. Inc., near Hollidaysburg, Pa.
BLGP 00.4	Blair Gap Run upstream of Duncansville STP, Duncansville, Pa.
BLLG 00.9	Blacklog Creek upstream of Orbisonia-Rockhill Jt. M.A., Orbisonia, Pa.
BLLG 04.6	Blacklog Creek upstream of Peterson Rd. Bridge
BOBS 00.9	Bobs Creek at tractor crossing, near Reynoldsdale, Pa.
BOBS 11.4	Bobs Creek at ball field, near Pavia, Pa.
BRUS 00.1	Brush Creek, near Breezewood, Pa.
BSPR	Boiling Springs Run upstream of General Refractories Co., Greenfield Twp., Pa.
BUFF 00.4	Buffalo Creek at SR 1007 Bridge, Newport, Pa.
BUFF 14.6	Buffalo Creek off of Rte. 849, upstream of Eschol, Pa.
CLOV 00.1	Clover Creek at church near mouth, Williamsburg, Pa.
COCO 00.2	Cocolamus Creek at old Rte. 22 Bridge, Millerstown, Pa.
COCO 09.6	Cocolamus Creek at T 475 Bridge, Greenwood, Twp., Pa.
DELA 00.2	Delaware Creek upstream of Thompsontown M.A., Thompsontown, Pa.
DUNN 00.1	Dunning Creek at mouth, Bedford, Pa.
DUNN 09.9	Dunning Creek upstream of E. St. Clair Twp. M.A. STP discharge, East St. Clair Twp. , Pa.
ELKC 00.1	East Licking Creek at church on Rte. 333 upstream of of Rte. 333/Rte. 75 intersection
ELKC 09.8	E. Licking Cr. Drive (SR 4002) Bridge, above Clearview Reservoir
FRNK 01.6	Frankstown Branch Juniata River immediately upstream of Alexandria -Porter Twp. J.A. STP, Porter Twp., Pa.
FRNK 18.9	Frankstown Branch Juniata River near Williamsburg, Pa.
FRNK 32.5	Frankstown Branch Juniata River near Hollidaysburg, Pa.
FRNK 38.1	Frankstown Branch Juniata River immediately upstream of Appleton Papers Inc. wastewater discharge, Brooks Mill, Pa.
FRNK	Frankstown Branch Juniata River at Greenfield Twp. M.A., Claysburg, Pa.
GTRC 02.9	Great Trough Creek at Trough Creek State Park, upstream of Trough Creek Drive Bridge.
HALT	Halter Creek upstream of New Enterprise Stone and Lime, Taylor Twp., Pa.
HONY 00.2	Honey Creek at Reedsville, Pa.
JACK 02.9	Jacks Creek at SR 2004 Bridge, between Lewistown and Maitland, Pa.
JUN 02.0	Juniata River at Amity Hall, Pa.
JUN 17.3	Juniata River upstream of the confluence of Cocolamus Creek, Millerstown, Pa.
JUN 34.0	Juniata River at Mifflintown, Pa.
JUN 47.0	Juniata River upstream of the confluence of Kiahacoquillas Creek, Lewistown, Pa.
JUN 84.6	Juniata River at Mapleton Depot, Pa.
KISH 00.4	Kishacoquillas Creek at Lewistown, Pa.
KISH	Kishacoquillas Creek upstream of Burnham Borough Authority STP, Burnham, Pa.
KISH 05.5	Kishacoquillas Creek upstream of Standard Steel, Burnham, Pa.
KISH 15.6	Kishacoquillas Creek immediately upstream of Union Twp. M.A. STP, Belleville, Pa.
LAUG 00.1	Little Augwick Creek near Brownsville, Pa.
LJUN 15.0	Little Juniata River immediately upstream of Tyrone Borough STP, Tyrone, Pa.
LJUN 19.4	Little Juniata River upstream of PPG Works #27, Antis Twp., Pa.
LJUN 29.6	Little Juniata River upstream of Altoona City Authority East STP, Altoona, Pa.

Table 3. Chlorine Demand Sample Site Locations —Continued

Sample Site	Location
NBTC 03.1	Narrows Branch Tuscarora Creek at SR 4007 Bridge, Concord, Pa.
RAYS	Raystown Branch Juniata River upstream of Hedstrom Inc., Bedford, Pa.
RAYS 04.6	Raystown Branch Juniata River downstream of Raystown Dam
RAYS 42.8	Raystown Branch Juniata River upstream of Saxton Borough STP, Saxton, Pa.
RAYS 54.1	Raystown Branch Juniata River at Hopewell, Pa.
RAYS 80.5	Raystown Branch Juniata River immediately downstream of the confluence of Greys Run, West Providence Twp., Pa.
RAYS 103	Raystown Branch Juniata River downstream of covered bridge on S.R. 4005 near Manns Choice, Pa.
SBEC 01.4	South Bald Eagle Creek at USGS gauging station, Tyrone, Pa.
SHAD 04.3	Shade Creek upstream of Shade Gap Area M.A., Shade Gap, Pa.
SHUP	Shoup Run immediately upstream of Dudley-Barnettstown W.A. , Carbon Twp., Pa.
SIDE 00.1	Sideling Hill Creek near Brownsville, Pa.
6MIL 00.2*	Sixmile Run, at T-864 Bridge, Moshannon State Forest, Centre County, Pa.
SPRU 01.0	Spruce Creek at Pennsylvania Fish and Boat Commission Special Regulations Area, near Spruce Creek, Pa.
SPRU 10.6	Spruce Creek at Rte 45 Bridge, Graysville, Pa.
STST 01.0	Standing Stone Creek at Huntington, Pa.
STST 26.8	Standing Stone Creek at first bridge upstream of SR1023/Black Lick Rd. Jct., Jackson Twp., Pa.
TRTR*	Trout Run upstream of Shippensburg W.A. Treatment Facility, Roxbury, Pa.
TSPC 00.1	Three Spring Creek near Three Springs, Pa.
TUSC 00.6	Tuscarora Creek at Mifflintown, Pa.
TUSC 22.5	Tuscarora Creek near Reeds Gap, Pa.
TUSC 39.3	Tuscarora Creek below confluence of Trough Spring Branch, near Blairs Mills, Pa.
WILL 00.4	Willow Creek near Reeds Gap, Pa.
YELL 03.5	Yellow Creek at SR 1009 Bridge, Hopewell Twp., Pa.

* Not in Juniata Subbasin

TROUT STOCKED FISHERIES FISH COMMUNITY DATA

Methods

Fish community data were collected at 15 stream reaches in the Juniata Subbasin between July 20 and August 11, 1995 (Table 4). Fish communities were sampled by electofishing, using either a backpack or a towboat electofishing unit, depending on the size of the stream. Most of the streams were sampled with the backpack unit, which consisted of a Honda generator (Model EX 350) with a Coffelt variable voltage pulsator (Model Mark-10). The towboat unit consisted of a Honda generator and a Coffelt variable voltage pulsator (Model Mark-10). Electrofishing was performed until all representative habitats were sampled. Most fish were identified in the field and released at the site of capture. However, some individuals that could not be identified in the field were preserved in a 90 percent solution of alcohol, and identified in the laboratory.

Results

Fish community data are summarized in Appendix C.

Table 4. Trout Stocked Fisheries Sample Site Locations

Sample Station	Sample Station Location	Date	Time	Temperature (°C)	Discharge (cfs)	Segment Length (ft)
BEAV	Beaverdam Branch at SR 1002 bridge in Hollidaysburg, Pa.	8/10/95	1350	19.9	14.27	885
BLGP	Blairs Gap Run at Valley Forge Rd. near Hollidaysburg, Pa.	8/10/95	1135	19.2	2.75	645
CLER	Clear Creek upstream of SR 2025 bridge near Everett, Pa.	8/8/95	900	19.6	3.34	625
DECK	Decker Run upstream of SR 4031 bridge near Tyrone, Pa.	8/7/95	1430	20.9	0.965	415
DOER	Doe Run at Rt. 322 bridge near Mexico, Pa.	7/21/95	1230	20.4	3.45	370
FRNK1	Frankstown Branch at railroad bridge along SR 2017 near Mt. Etna, Pa.	8/7/95	1230	21.2	147.83	1,135
FRNK2	Frankstown Branch at bridge on Johnstown Rd. near Leamersville, Pa.	8/10/95	800	18.5	23.82	1,480
IMLR	Imlertown Run along T-508 near Imlertown, Pa.	8/8/95	1200	20	2.2	340
LAUR	Laurel Run - T-535 bridge near Jericho Mills, Pa.	7/20/95	1500	20.1	2.04	330
LJUN	Little Juniata River at old Rt. 220 bridge in Tipton, Pa.	8/11/95	900	19.8	14.91	1,700
LLST	Little Lost Creek - SR 2007 bridge near Oakland Mills, Pa.	7/20/95	1300	24.1	2.15	565
LOST1	Lost Creek at Jericho Mills, Pa.	7/21/95	1000	19.1	14.65	585
LOST2	Lost Creek downstream of confluence with Big Run	7/31/95	900	21.2	15.68	425
RAYS	Raystown Branch at T-414 river crossing near Mann's Choice, Pa.	8/8/95	1440	22.3	11.07	1,500
UTLC	Unnamed tributary to Lost Creek	7/31/95	1345	19.2	0.131	185

REFERENCES CITED

McGarrell, Charles A. 1997. Water Quality and Biological Assessment of the Juniata Subbasin. Harrisburg, Pa.: Susquehanna River Basin Commission, Publication No. 178, 98pp.

Plafkin, J.L., M.T. Barbour, D.P. Kimberly, S.K. Gross, R.M. Hughes. 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water, EPA/440/4-89/001, May 1989.

Appendix A
Physico-Chemical Water Quality, Physical Habitat, and Biological Information Collected Immediately Upstream and Downstream of Permitted Wastewater Discharges

Table A1. Chemical Water Quality Data

Station	Date	Time	W Temp 10	Ph Field 400	DO 300	Spec Cond 94	Alk Fld 410	Alk Fld CO3
	yymmdd	hhmm	°C	S.U.	mg/l		mg/l	mg/l
BEAV(D)	95/09/07	900	18	7.6	8.2	650	91	
BEAV(U)	95/09/07	810	17	7.6	7.8	560	90	
BEAV 04.0(D)	95/08/01	1830	24	7.5	7.2	575	56	
BEAV 04.0(U)	95/08/01	1700	23.5	7.35	7.8	600	40	
BLGP 00.4(U)	95/08/01	2000	24.5	7.35	6.2	170	52	
BLGP 00.4(D)	95/08/01	1900	25	6.9	6.4	360	96	
BLLG 00.9(D)	95/07/20	930	19.5	7.7	7.6	158	64	
BLLG 00.9(U)	95/07/20	900	19	8.25	8.4	130	42	
BSPR(D)	95/09/07	1250	16	8.25	9.6	480	200	
BSPR(U)	95/09/07	1337	16	8.35	10	480	204	
DELA 00.2(D)	95/08/08	905	16	7.85	7.6	485	150	
DELA 00.2(U)	95/08/08	940	15.5	6.8	8.8	375	124	
DUNN 09.9(D)	95/07/27	1340	24.5	7.65	7.2	260	80	
DUNN 09.9(U)	95/07/27	1430	25	7.8	8.4	250	96	
FRNK 01.6(D)	95/07/24	1700	24	7.7	8.2	460	120	
FRNK 01.6(U)	95/07/24	1830	23	8.3	8.2	460	124	
FRNK 38.1(D)	95/07/31	1600	31	7.85	6	>1,000	200	
FRNK 38.1(U)	95/07/31	1645	25	8.25	8.2	405	122	
FRNK(D)	95/07/27	915	19.5	7.9	7.6	300	88	
FRNK(U)	95/07/27	930	20	7.9		280	92	
HALT(D)	95/09/06	1740	18	8.3	7.6	725	199	
HALT(U)	95/09/06	1830	17	8.3	7.9	580	184	
KISH(D)	95/08/08	1500	19	8.65	8.8	330	132	
KISH(U)	95/08/08	1530	19	8.55	8.8	350	124	
KISH 05.5(D)	95/08/08	1530	19	8.55	8.8	350	124	
KISH 05.5(U)	95/08/08	1340	19.5	8.3	10.2	230	142	
LJUN 15.0(D)	95/08/07	1200	25	8.25	8.4	340	76	<2
LJUN 15.0(U)	95/08/07	1030	25	8.1	8.2	68	68	
LJUN 19.4(D)	95/08/02	1300	26	8.3	9.2	330	84	
LJUN 19.4(U)	95/08/02	1345	26	7.15	8	310	72	
LJUN 29.6(D)	95/08/02	1445	23	6.95	7.8	550	76	
LJUN 29.6(U)	95/08/02	1500	23	6.7	9.2	250	78	
RAYS(D)	95/09/06	1411	22	8.05	10	480	116	
RAYS(U)	95/09/06	1508	22	8.05	10.2	482	116	
RAYS 42.8(D)	95/07/25	1200	26	8.2	8.4	288	88	2
RAYS 42.8(U)	95/07/25	1300	26	8.3	8.6	285	84	
SHUP(D)	95/09/12	730	11	4.1	9.6	500	0	
SHUP(U)	95/09/12	820	11	3.85	10.6	510	0	
TRTR(D)	95/09/12	1208	14.5	6.8	9.6	87	24	
TRTR(U)	95/09/12	1315	14	6.7	9.6	78	24	

Table A1. Chemical Water Quality Data—Continued

Station	Acid Fld 435	S. C. lab 95	pH Lab 403	Alk 410	D. Res 515	NF. Res 530	TOT. N 600	N. Diss 602
	mg/l			mg/l	mg/l	mg/l	mg/l	mg/l
BEAV(D)	5	655	7.5	90	448	10	10.2	10.2
BEAV(U)	5	675	7.4	92	462	4	10.7	10.2
BEAV 04.0(D)	4	594	6.9	52	492	22	7.39	7.21
BEAV 04.0(U)	4	592	6.8	36	460	12	7.92	7.74
BLGP 00.4(U)	4	166	6.7	48	116	2	0.73	0.67
BLGP 00.4(D)	16	348	7	82	250	4	3.17	2.99
BLLG 00.9(D)	4	158	7.6	60	134	6	0.53	0.47
BLLG 00.9(U)	<2	156	7.8	60	122	6	0.53	0.56
BSPR(D)	<1	472	8.3	196	314	6	2.17	2.17
BSPR(U)	0	469	8.3	204	306	2	2.11	2.08
DELA 00.2(D)	4	387	7.4	132	252	10	5.1	4.93
DELA 00.2(U)	36	365	7.5	128	256	14	3.7	3.7
DUNN 09.9(D)	6	264	7.7	76	186	2	1.47	1.38
DUNN 09.9(U)	4	261	8	76	194	16	1.5	1.44
FRNK 01.6(D)	4	474	8.2	132	338	6	2.64	2.58
FRNK 01.6(U)	0	461	8.3	132	342	16	2.61	2.58
FRNK 38.1(D)	16	1265	7.9	194	792	18	2.9	2.7
FRNK 38.1(U)	<2	419	8.6	134	266	14	2.79	2.14
FRNK(D)	4	305	7.9	92	238	6	1.58	1.52
FRNK(U)	4	277	8.1	90	192	10	1.64	1.64
HALT(D)	0	697	8.3	196	498	28	4.69	4.69
HALT(U)	0	560	8.2	188	406	<2	3.93	3.81
KISH(D)	0	349	8.6	144	266	12	3.17	3.11
KISH(U)	0	346	8.5	140	missed	16	3.17	3.17
KISH 05.5(D)	0	346	8.5	140	missed	16	3.17	3.17
KISH 05.5(U)	0	343	8.4	138	278	4	3.58	3.58
LJUN 15.0(D)	0	346	8.2	78	242	<2	1.94	1.82
LJUN 15.0(U)	<2	291	7.2	72	202	12	1.85	1.82
LJUN 19.4(D)	0	323	8.8	76	222	10	2.67	2.29
LJUN 19.4(U)	10	324	9	74	222	2	2.29	2.23
LJUN 29.6(D)	12	543	6.9	60	370	14	10.9	10.9
LJUN 29.6(U)	20	272	8.5	78	196	<2	0.38	0.35
RAYS(D)	1	482	8	118	292	10	3.23	3.23
RAYS(U)	1	482	8	114	314	8	3.75	3.75
RAYS 42.8(D)	0	294	8.2	98	226	10	2.02	1.94
RAYS 42.8(U)	0	292	8.3	96	222	12	2.11	2.08
SHUP(D)	41	506	4	0	482	4	1.23	1.2
SHUP(U)	46	517	3.9	0	374	<2	1.2	1.23
TRTR(D)	3	80	6.7	28	28	<2	0.26	0.23
TRTR(U)	6	78	6.6	28	18	<2	0.21	0.18

Table A1. Chemical Water Quality Data—Continued

Station	D. NH3 608 mg/l	T. NH3 610 mg/l	D. NO2 613 mg/l	T. NO2 615 mg/l	D. NO3 618 mg/l	T. NO3 620 mg/l	TP 665 mg/l	DP 666 mg/l
BEAV(D)	0.04	0.05	0.02	0.024	8.30	7.24	0.89	0.86
BEAV(U)	0.03	0.04	0.022	0.028	9.61	10.00	0.91	0.89
BEAV 04.0(D)	<0.02	<0.02	0.018	0.018	6.51	6.51	0.74	0.64
BEAV 04.0(U)	<0.02	0.03	0.028	0.026	7.23	7.23	0.85	0.7
BLGP 00.4(U)	<0.02	<0.02	<0.004	<0.004	0.51	0.55	0.04	0.034
BLGP 00.4(D)	0.04	0.05	0.032	0.032	2.74	2.74	0.46	0.27
BLLG 00.9(D)	<0.02	<0.02	0.004	0.006	0.33	0.33	0.04	0.022
BLLG 00.9(U)	<0.02	<0.02	0.004	0.006	0.31	0.31	0.03	0.027
BSPR(D)	0.03	0.03	0.01	0.004	1.95	2.16	0.05	0.038
BSPR(U)	0.03	0.05	0.004	0.004	2.08	2.07	0.05	0.033
DELA 00.2(D)	1.03	1.05	0.048	0.05	2.85	2.85	0.19	0.169
DELA 00.2(U)	<0.02	<0.02	0.006	0.006	2.81	3.03	0.04	0.032
DUNN 09.9(D)	<0.02	<0.02	0.018	0.02	1.21	1.23	0.05	0.027
DUNN 09.9(U)	<0.02	0.02	0.02	0.02	1.23	1.23	0.05	0.028
FRNK 01.6(D)	<0.02	<0.02	0.01	0.01	2.17	2.19	0.11	0.094
FRNK 01.6(U)	<0.02	<0.02	0.008	0.008	2.15	2.45	0.11	0.091
FRNK 38.1(D)	0.4	0.4	0.52	0.53	0.76	0.77	0.31	0.267
FRNK 38.1(U)	0.03	0.03	0.024	0.024	1.67	1.61	0.1	0.094
FRNK(D)	0.03	0.03	0.012	0.012	1.38	1.46	0.09	0.073
FRNK(U)	<0.02	<0.02	0.006	0.008	1.38	1.40	0.04	0.026
HALT(D)	0.19	0.2	0.136	0.15	3.51	4.03	0.89	0.88
HALT(U)	0.08	0.11	0.062	0.06	3.15	3.50	0.38	0.368
KISH(D)	<0.02	<0.02	0.008	0.008	2.50	2.50	0.14	0.135
KISH(U)	<0.02	<0.02	0.008	0.008	2.54	2.54	0.15	0.139
KISH 05.5(D)	<0.02	<0.02	0.008	0.008	2.54	2.54	0.15	0.139
KISH 05.5(U)	<0.02	<0.02	0.01	0.01	2.89	2.89	0.17	0.157
LJUN 15.0(D)	<0.02	0.02	0.056	0.058	1.37	1.39	0.28	0.219
LJUN 15.0(U)	<0.02	<0.02	0.008	0.008	1.46	1.46	0.18	0.157
LJUN 19.4(D)	<0.02	0.02	0.01	0.01	1.84	1.93	0.29	0.269
LJUN 19.4(U)	<0.02	<0.02	0.008	0.008	1.86	1.88	0.29	0.275
LJUN 29.6(D)	0.03	0.04	0.02	0.02	10.20	10.20	1.63	1.54
LJUN 29.6(U)	<0.02	<0.02	0.004	0.004	0.09	0.09	0.05	0.042
RAYS(D)	0.16	0.16	0.182	0.198	2.55	2.66	0.24	0.234
RAYS(U)	0.23	0.23	0.19	0.2	2.89	3.06	0.28	0.268
RAYS 42.8(D)	<0.02	<0.02	0.006	0.008	1.62	1.64	0.04	0.029
RAYS 42.8(U)	<0.02	<0.02	0.006	0.008	1.62	1.64	0.05	0.033
SHUP(D)	<0.02	<0.02	<0.004	<0.004	1.17	1.17	0.029	0.02
SHUP(U)	<0.02	<0.02	<0.004	<0.004	1.17	1.17	0.024	0.02
TRTR(D)	<0.02	<0.02	<0.004	0.004	0.17	0.17	0.025	0.018
TRTR(U)	<0.02	<0.02	<0.004	<0.004	0.20	0.20	0.023	0.019

Table A1. Chemical Water Quality Data—Continued

Station	TOC 680	Hard 900	Ca 916	Mg 927	Na 929	K 937	Cl 940	SO4 945
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
BEAV(D)	3.4	210	64.4	16.7	41.7	5.22	62	104
BEAV(U)	3.5	216	64.5	16.9	43	5.3	62	106
BEAV 04.0(D)	3.8	202	61.7	16.6	36	3.94	57	120
BEAV 04.0(U)	4.4	193	53.3	15.1	37.9	4.14	58	125
BLGP 00.4(U)	1.8	61	21.3	4.14	4.49	1.62	7	16.8
BLGP 00.4(D)	2.9	123	42.4	9.14	16.1	2.57	25	36.2
BLLG 00.9(D)	3.2	70	21.2	4.67	2.86	1.97	3	11.3
BLLG 00.9(U)	3.2	65	21.3	4.67	2.98	1.49	3	11.4
BSPR(D)	1.5	220	77.3	20.2	4.1	1.58	9	28.2
BSPR(U)	1.6	222	75.9	20.4	3.75	1.14	9	28.2
DELA 00.2(D)	1.9	162	52	9.39	7.74	2.53	14	31.9
DELA 00.2(U)	1.1	168	52.6	9.18	4.99	1.77	11	31.1
DUNN 09.9(D)	2.1	98	33.9	7.93	4.45	1.82	7	36.3
DUNN 09.9(U)	2.3	100	33	7.82	4.58	1.59	7	37.5
FRNK 01.6(D)	3.3	164	52.3	16.2	22.2	3.1	34	44.3
FRNK 01.6(U)	3.1	157	53.3	16.4	22	3.15	33	44.5
FRNK 38.1(D)	20.3	230	65.2	16.1	146	17.2	208	90.8
FRNK 38.1(U)	2.6	175	44.6	14.4	12.6	2.53	19	34.8
FRNK(D)	2.0	102	34	7.79	13.4	2.14	19	22.6
FRNK(U)	1.8	97	34	7.91	9.46	1.79	14	20.8
HALT(D)	3.3	273	65.4	28.5	29.5	4.86	44	92.5
HALT(U)	2.3	233	56.2	25.5	17.7	3.04	23	60
KISH(D)	2.1	162	49.1	12.4	4.78	2.44	9	20.8
KISH(U)	2.0	160	48	12.2	4.8	2.35	9	20.4
KISH 05.5(D)	2.0	160	48	12.2	4.8	2.35	9	20.4
KISH 05.5(U)	2.1	156	46.9	11.9	5	2.48	9	17.8
LJUN 15.0(D)	3.5	89	34.7	7.93	22.6	2.93	22	50.7
LJUN 15.0(U)	2.6	88	34.7	8.17	13.4	2.71	20	28.8
LJUN 19.4(D)	2.9	92	39.7	8.41	17.6	3.45	24	34.6
LJUN 19.4(U)	2.9	89	39.3	8.27	17.1	3	26	35
LJUN 29.6(D)	4.7	125	43.7	8.61	44.7	7.9	66	55.7
LJUN 29.6(U)	2.1	95	39.7	6.75	9.6	2.3	16	28.8
RAYS(D)	4.2	189	53.9	12.9	16.1	3.11	27	72.4
RAYS(U)	4.3	187	53.4	12.9	17.1	3.41	30	72.2
RAYS 42.8(D)	2.7	107	35.8	11	5.89	2.25	10	25.5
RAYS 42.8(U)	3.0	109	35.7	11	5.83	2.69	10	25.9
SHUP(D)	<1	132	35.7	22	8.14	1.99	6	256
SHUP(U)	<1	126	49	27.3	8.45	1.82	6	263
TRTR(D)	1.2	26	10.8	2.35	1.88	0.75	2	8.2
TRTR(U)	<1	27	10.9	2.4	1.25	0.83	2	7.4

Table A1. Chemical Water Quality Data—Continued

Station	Cu 1042 µg/l	Fe 1045 µg/l	Fe Diss. 1046 µg/l	Pb 1051 µg/l	Mn 1055 µg/l	Mn Diss. 1056 µg/l	Ni 1067 µg/l	Zn 1092 µg/l
BEAV(D)	7.1	223	44	1.1	117	34	11.1	34.6
BEAV(U)	6.2	166	63	1	104	39	11.9	27.1
BEAV 04.0(D)	6	235	17	1	678	575	28.3	51.4
BEAV 04.0(U)	6.8	240	13	1.1	816	798	33.5	65.1
BLGP 00.4(U)	<4	57	<10	<1	25	67	<4	<5
BLGP 00.4(D)	<4	218	15	<1	28	80	<4	9.9
BLLG 00.9(D)	<4	313	110	<1	21.7	16	<4	<5
BLLG 00.9(U)	<4	368	99	<1	23.3	24	<4	<5
BSPR(D)	<4	148	10	<1	<10	<10	<4	<5
BSPR(U)	<4	158	<10	<1	<10	<10	<4	<5
DELA 00.2(D)	<4	121	<10	<1	<10	<10	<4	6.1
DELA 00.2(U)	<4	74	<10	<1	17	<10	<4	5
DUNN 09.9(D)	<4	323	53	<1	30.8	<10	<4	<5
DUNN 09.9(U)	<4	263	47	<1	22.9	<10	<4	<5
FRNK 01.6(D)	<4	205	<10	<1	30.6	16	<4	7.2
FRNK 01.6(U)	<4	178	<10	<1	29.1	15	<4	11.5
FRNK 38.1(D)	<4	155	94	1.2	284	259	15.6	11.4
FRNK 38.1(U)	<4	70	<10	<1	15	11	<4	<5
FRNK(D)	<4	121	20	<1	10.7	<10	<4	<5
FRNK(U)	<4	123	18	<1	14.9	<10	<4	<5
HALT(D)	<4	198	39	<1	31	25	<4	12.2
HALT(U)	<4	121	44	<1	31	21	<4	6.1
KISH(D)	<4	156	15	<1	17	17	<4	<5
KISH(U)	<4	133	<10	<1	14	14	<4	<5
KISH 05.5(D)	<4	133	<10	<1	14	14	<4	<5
KISH 05.5(U)	<4	118	12	<1	45	46	<4	<5
LJUN 15.0(D)	<4	231	17	<1	68	40	<4	8.6
LJUN 15.0(U)	<4	300	22	<1	113	104	<4	5.6
LJUN 19.4(D)	<4	231	12	<1	54	41	<4	9
LJUN 19.4(U)	<4	142	<10	<1	34	77	<4	7
LJUN 29.6(D)	8.9	125	38	<1	16	24	<4	53.4
LJUN 29.6(U)	<4	205	21	<1	29	22	<4	<5
RAYS(D)	<4	171	41	<1	40	34	<4	5.3
RAYS(U)	<4	166	43	<1	37	36	<4	5.7
RAYS 42.8(D)	<4	272	11	<1	29.6	19	<4	5.9
RAYS 42.8(U)	<4	223	60	<1	30.9	22	<4	7.7
SHUP(D)	13.5	911	127	<1	1,610	1,470	176	335
SHUP(U)	12.8	294	278	<1	1,810	1,810	179.7	317
TRTR(D)	<4	23	<10	<1	16	42	<4	<5
TRTR(U)	<4	<10	<10	<1	47	<10	<4	<5

Table A1. Chemical Water Quality Data—Continued

Station	Al 1105 µg/l	Al Diss. 1106 µg/l	TOP 70507 mg/l
BEAV(D)	174.3	18.6	0.81
BEAV(U)	173.4	14.5	0.87
BEAV 04.0(D)	429.9	55.2	0.61
BEAV 04.0(U)	485.6	55.8	0.67
BLGP 00.4(U)	33.5	14.3	0.013
BLGP 00.4(D)	127.3	19.2	0.412
BLLG 00.9(D)	136.8	12.7	0.002
BLLG 00.9(U)	136.6	13.5	0.002
BSPR(D)	76.8	<10	0.02
BSPR(U)	78.1	<10	0.016
DELA 00.2(D)	60	<10	0.169
DELA 00.2(U)	39.6	<10	0.012
DUNN 09.9(D)	111.2	<10	0.013
DUNN 09.9(U)	92.3	<10	0.013
FRNK 01.6(D)	93.5	35.9	0.08
FRNK 01.6(U)	82.3	29.1	0.08
FRNK 38.1(D)	275.2	198.9	0.242
FRNK 38.1(U)	41.6	13.1	0.075
FRNK(D)	80.3	<10	0.054
FRNK(U)	78.2	<10	0.008
HALT(D)	125.1	13	0.86
HALT(U)	45.9	13.5	0.348
KISH(D)	65.2	<10	0.122
KISH(U)	56.8	<10	
KISH 05.5(D)	56.8	<10	
KISH 05.5(U)	70.3	11.2	0.144
LJUN 15.0(D)	91.5	15.8	0.227
LJUN 15.0(U)	74.4	18.4	0.145
LJUN 19.4(D)	76.4	25.9	0.265
LJUN 19.4(U)	56.3	23.6	0.266
LJUN 29.6(D)	49.6	10.5	1.55
LJUN 29.6(U)	50.5	10.5	0.021
RAYS(D)	39.5	<10	0.186
RAYS(U)	44.1	<10	0.23
RAYS 42.8(D)	218	97.8	0.011
RAYS 42.8(U)	198	124	0.012
SHUP(D)	5.010	4.820	0.004
SHUP(U)	4.660	4.660	<0.002
TRTR(D)	97.1	53.9	<0.002
TRTR(U)	18.1	10	0.002

Table A2. Physical Habitat Data

Parameter	BEAV(D)	BEAV(U)	BEAV 04.0(D)	BEAV 04.0(U)	BLGP 00.4(D)	BLGP 00.4(U)
Substrate	19	18	18	19	18	18
Embeddedness	14	14	18	8	10	18
Velocity/Depth Diversity	18	16	14	18	13	17
Pool/Riffle Ratio	14	12	14	8	14	14
Pool Quality	13	9	7	11	11	7
Riffle/Run Quality	13	8	14	13	9	9
Channel Alteration	10	9	11	4	8	11
U/L Streambank Erosion	6	7	6	7	8	9
U/L Strmbnk Stability	9	9	9	9	9	9
Vegetative Cover	8	6	8	8	8	8
FRB Zone Width	3	3	5	2	5	5
Total Habitat Score	**127**	**111**	**124**	**107**	**122**	**125**

Parameter	BLLG 00.9(D)	BLLG 00.9(U)	BSPR(D)	BSPR(U)	DELA 00.2(D)	DELA 00.2(U)
Substrate	19	20	14	14	10	17
Embeddedness	19	19	8	8	11	12
Velocity/Depth Diversity	17	14	16	16	16	8
Pool/Riffle Ratio	15	15	11	11	13	11
Pool Quality	14	14	14	12	13	7
Riffle/Run Quality	10	14	10	10	10	8
Channel Alteration	11	5	10	10	9	7
U/L Streambank Erosion	10	10	2	2	5	6
U/L Strmbnk Stability	10	10	5	5	9	8
Vegetative Cover	9	10	6	9	7	9
FRB Zone Width	0	3	0	1	5	5
Total Habitat Score	**134**	**134**	**96**	**98**	**108**	**98**

Parameter	DUNN 09.9(D)	DUNN 09.9(U)	FRNK 01.6(D)	FRNK 01.6(U)	FRNK 38.1(D)	FRNK 38.1(U)
Substrate	16	16	19	19	18	18
Embeddedness	15	15	11	11	15	15
Velocity/Depth Diversity	15	8	19	19	16	16
Pool/Riffle Ratio	12	2	14	14	15	15
Pool Quality	14	13	14	14	10	10
Riffle/Run Quality	8	0	11	15	14	14
Channel Alteration	4	8	14	14	9	10
U/L Streambank Erosion	8	8	10	10	7	1
U/L Strmbnk Stability	9	8	10	10	9	3
Vegetative Cover	5	7	8	8	5	2
FRB Zone Width	3	1	5	9	3	1
Total Habitat Score	**109**	**86**	**135**	**143**	**121**	**105**

Table A2. Physical Habitat Data—Continued

Parameter	FRNK(D)	FRNK(U)	HALT(D)	HALT(U)	KISH(D)	KISH(U)
Substrate	20	19	10	10	17	17
Embeddedness	16	16	5	5	12	12
Velocity/Depth Diversity	19	14	15	16	17	17
Pool/Riffle Ratio	20	20	12	10	14	14
Pool Quality	14	7	11	11	14	14
Riffle/Run Quality	14	7	8	8	15	13
Channel Alteration	12	14	3	3	13	13
U/L Streambank Erosion	2	9	10	10	10	10
U/L Strmbnk Stability	2	10	10	10	10	10
Vegetative Cover	4	9	5	7	7	7
FRB Zone Width	2	4	1	2	4	4
Total Habitat Score	**125**	**129**	**90**	**92**	**133**	**131**

Parameter	KISH 05.5(D)	KISH 05.5(U)	LJUN 15.0(D)	LJUN 15.0(U)	LJUN 19.4(D)	LJUN 19.4(U)
Substrate	17	20	19	19	18	18
Embeddedness	12	19	17	18	16	16
Velocity/Depth Diversity	17	20	17	14	19	19
Pool/Riffle Ratio	14	15	14	10	14	14
Pool Quality	14	15	11	13	15	15
Riffle/Run Quality	13	15	13	9	14	14
Channel Alteration	13	14	9	13	10	10
U/L Streambank Erosion	10	10	10	10	9	9
U/L Strmbnk Stability	10	10	10	10	10	10
Vegetative Cover	7	8	7	8	7	7
FRB Zone Width	4	4	3	4	10	10
Total Habitat Score	**131**	**150**	**130**	**128**	**142**	**142**

Parameter	LJUN 29.6(D)	LJUN 29.6(U)	RAYS(D)	RAYS(U)	RAYS 42.8(D)	RAYS 42.8(U)
Substrate	18	18	16	16	15	19
Embeddedness	14	14	16	16	11	16
Velocity/Depth Diversity	16	14	15	11	14	19
Pool/Riffle Ratio	11	14	10	15	1	1
Pool Quality	13	7	15	7	14	14
Riffle/Run Quality	9	7	8	7	0	14
Channel Alteration	11	11	7	12	1	14
U/L Streambank Erosion	9	9	6	8	6	9
U/L Strmbnk Stability	10	10	9	10	9	10
Vegetative Cover	8	8	5	9	8	9
FRB Zone Width	3	3	5	5	5	9
Total Habitat Score	**122**	**115**	**112**	**116**	**84**	**134**

Table A2. Physical Habitat Data—Continued

Parameter	SHUP(D)	SHUP(U)	TRTR(D)	TRTR(U)
Substrate	19	19	19	19
Embeddedness	18	16	18	19
Velocity/Depth Diversity	10	10	8	13
Pool/Riffle Ratio	15	15	15	15
Pool Quality	7	7	5	10
Riffle/Run Quality	8	8	9	11
Channel Alteration	12	8	8	11
U/L Streambank Erosion	9	5	8	8
U/L Strmbnk Stability	10	8	9	9
Vegetative Cover	8	9	6	8
FRB Zone Width	5	5	2	4
Total Habitat Score	**121**	**110**	**107**	**127**

Table A3. Biological Data

Order	Family	Genus	BEAV(D)	BEAV(U)	BEAV 04.0(D)	BEAV 04.0(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus				
		Ordobrevia				
		Stenelmis	1		2	
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*		1		
Diptera	Athericidae	*Atherix*				
	Chironomidae		32	20	29	58
	Empididae	*Hemerodromia*				3
		Rhamphomyia				1
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*				
		Hexatoma				
		Tipula				
Ephemeroptera	Baetidae	*Baetis*				
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*				
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				
		Stenonema				
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*				
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*				
		Nigronia				
	Sialidae	*Sialis*				
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	BEAV(D)	BEAV(U)	BEAV 04.0(D)	BEAV 04.0(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	9			
		Hydropsyche	37	68	3	
		Parapsyche	1			
		Potamyia				2
		Sympitopsyche	18	32		
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*				
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Amphipoda	Gammaridae	*Gammarus*	3			4
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*	23		1	1
Pelecypoda	Sphaeridae	*Pisidium*				

Table A3. Biological Data—Continued

Order	Family	Genus	BLGP 00.4(D)	BLGP 00.4(U)	BLLG 00.9(D)	BLLG 00.9(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus			1	11
		Ordobrevia				
		Stenelmis	1	1	2	2
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*	7	6	14	23
Diptera	Athericidae	*Atherix*		1		
	Chironomidae		50	2	2	6
	Empididae	*Hemerodromia*	4			1
		Rhamphomyia				
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*			4	5
		Hexatoma				
		Tipula	1			
Ephemeroptera	Baetidae	*Baetis*	8		1	2
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*	8	33		1
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*			1	
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron	1	4		
		Stenonema	3	9	2	2
	Leptophlebidae	*Leptophlebia*		1		
	Oligoneuriidae	*Isonychia*	2	4	17	14
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*			4	2
		Nigronia				
	Sialidae	*Sialis*			2	
Odonata	Coenagrionidae	*Argia*			1	
	Gomphidae	*Arigomphus*				
		Stylogomphus				1
		Erpentogomphus				1
Plecoptera	Leuctridae	*Leuctra*		2		
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina	1	2		
		Perlesta		1		
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	BLGP 00.4(D)	BLGP 00.4(U)	BLLG 00.9(D)	BLLG 00.9(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	22	9	36	20
		Hydropsyche	3	1		
		Parapsyche	2			
		Potamyia	1			2
		Sympitopsyche	8	18	7	10
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*	1	39		
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*	1			
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*			1	
Amphipoda	Gammaridae	*Gammarus*	5			
Decapoda	Cambaridae	*Orconectes*				1
Gastropoda	Lymnaeidae	*Lymnaea*				1
Isopoda	Asellidae	*Asellus*	21			
Pelecypoda	Sphaeridae	*Pisidium*				

Table A3. Biological Data—Continued

Order	Family	Genus	BSPR(D)	BSPR(U)	DELA 00.2(D)	DELA 00.2(U)
Coleoptera	Elmidae	*Gonielmis*		1		
		Macronychus		1		
		Optioservus	50	54	4	19
		Ordobrevia				
		Stenelmis			2	
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*	1			7
Diptera	Athericidae	*Atherix*	1	1		1
	Chironomidae		12	24	47	9
	Empididae	*Hemerodromia*			1	
		Rhamphomyia				
	Simulidae	*Simulium*		1	1	
	Tipulidae	*Antocha*	2	2	4	2
		Hexatoma	9			
		Tipula				
Ephemeroptera	Baetidae	*Baetis*	13	6	1	1
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*				
	Ephemerellidae	*Eurylophella*	1	3		
		Serratella				
	Ephemeridae	*Ephemera*				1
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				
		Stenonema				2
	Leptophlebidae	*Leptophlebia*				1
	Oligoneuriidae	*Isonychia*				
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*	2			
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*				
		Nigronia	4	1		2
	Sialidae	*Sialis*				
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	BSPR(D)	BSPR(U)	DELA 00.2(D)	DELA 00.2(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	4	3		5
		Hydropsyche		11		
		Parapsyche				
		Potamyia				
		Sympitopsyche	19	33		6
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*	1			
		Dolophilodes	1			
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*	3			
Amphipoda	Gammaridae	*Gammarus*	17	7	31	99
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*			1	
Pelecypoda	Sphaeridae	*Pisidium*				

Table A3. Biological Data—Continued

Order	Family	Genus	DUNN 09.9(D)	DUNN 09.9(U)	FRNK 01.6(D)	FRNK 01.6(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus	6	5	4	3
		Ordobrevia	7	13	11	
		Stenelmis	9	13	18	8
	Gyrinidae	*Dineutis*	2	1		
	Psephenidae	*Psephenus*	3		6	12
Diptera	Athericidae	*Atherix*	1			
	Chironomidae		2	23	8	1
	Empididae	*Hemerodromia*				1
		Rhamphomyia				
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*	1	2	3	1
		Hexatoma	1			
		Tipula				
Ephemeroptera	Baetidae	*Baetis*	38	1	4	6
		Callibaetis				
		Centroptilum				
		Heterocloeon				2
		Pseudocloeon				
	Caenidae	*Caenis*	3	43	11	6
	Ephemerellidae	*Eurylophella*			1	
		Serratella				1
	Ephemeridae	*Ephemera*		2		
	Heptageniidae	*Heptagenia*				1
		Leucrocuta				2
		Stenacron				
		Stenonema	9	12	8	17
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*	20			5
	Polymitarcidae	*Ephoron*				10
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*			1	
Megaloptera	Corydalidae	*Corydalus*	2			1
		Nigronia		4		
	Sialidae	*Sialis*		7	2	
Odonata	Coenagrionidae	*Argia*		1		2
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	DUNN 09.9(D)	DUNN 09.9(U)	FRNK 01.6(D)	FRNK 01.6(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	15		13	6
		Hydropsyche			3	
		Parapsyche				
		Potamyia				
		Sympitopsyche	10		6	9
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*	3		7	
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Amphipoda	Gammaridae	*Gammarus*				
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*			1	2
Pelecypoda	Sphaeridae	*Pisidium*				

Table A3. Biological Data—Continued

Order	Family	Genus	FRNK 38.1(D)	FRNK 38.1(U)	FRNK(D)	FRNK(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus	1		1	
		Ordobrevia	4			
		Stenelmis	10	15	1	1
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*		2	18	16
Diptera	Athericidae	*Atherix*	1	1	1	1
	Chironomidae		13	42	130	51
	Empididae	*Hemerodromia*		2	1	2
		Rhamphomyia				
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*	2	23	2	1
		Hexatoma				5
		Tipula				
Ephemeroptera	Baetidae	*Baetis*		3		1
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*		8	32	16
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				2
		Leucrocuta				
		Stenacron			1	
		Stenonema			12	
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*		3	3	13
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*			1	
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*		1		
		Nigronia		1		
	Sialidae	*Sialis*	4		2	
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*	1			
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina				1
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	FRNK 38.1(D)	FRNK 38.1(U)	FRNK(D)	FRNK(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	39	23	3	5
		Hydropsyche	16	2		
		Parapsyche				
		Potamyia				
		Sympitopsyche	8	10	6	33
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*			1	1
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Amphipoda	Gammaridae	*Gammarus*				
Decapoda	Cambaridae	*Orconectes*			1	
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*			4	
Pelecypoda	Sphaeridae	*Pisidium*	1			

Table A3. Biological Data—Continued

Order	Family	Genus	HALT(D)	HALT(U)	KISH(D)	KISH(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus	6	4	4	6
		Ordobrevia				
		Stenelmis				4
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*				1
Diptera	Athericidae	*Atherix*				
	Chironomidae		70	90	11	4
	Empididae	*Hemerodromia*			1	
		Rhamphomyia				
	Simulidae	*Simulium*	45	39		2
	Tipulidae	*Antocha*	6		7	14
		Hexatoma				
		Tipula				
Ephemeroptera	Baetidae	*Baetis*			4	4
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				1
	Caenidae	*Caenis*			9	5
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				
		Stenonema				
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*				
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*				
		Nigronia				
	Sialidae	*Sialis*				
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	HALT(D)	HALT(U)	KISH(D)	KISH(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*			5	6
		Hydropsyche		1		
		Parapsyche				
		Potamyia				
		Sympitopsyche			23	28
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*				
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*			2	
Amphipoda	Gammaridae	*Gammarus*	16	1	28	50
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*		1		
Pelecypoda	Sphaeridae	*Pisidium*				

Table A3. Biological Data—Continued

Order	Family	Genus	KISH 05.5(D)	KISH 05.5(U)	LJUN 15.0(D)	LJUN 15.0(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus	6	27	1	
		Ordobrevia				
		Stenelmis	4	11	71	9
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*	1	3	3	
Diptera	Athericidae	*Atherix*			2	
	Chironomidae		4	15	75	15
	Empididae	*Hemerodromia*		2		4
		Rhamphomyia				
	Simulidae	*Simulium*	2	1	16	
	Tipulidae	*Antocha*	14	10	2	8
		Hexatoma				
		Tipula				
Ephemeroptera	Baetidae	*Baetis*	4	23		
		Callibaetis		1		
		Centroptilum				
		Heterocloeon				
		Pseudocloeon	1	5		
	Caenidae	*Caenis*	5	8	3	35
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				
		Stenonema		6		9
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*				9
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*			1	
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*			2	3
		Nigronia				1
	Sialidae	*Sialis*			2	
Odonata	Coenagrionidae	*Argia*			1	
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla		1		
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	KISH 05.5(D)	KISH 05.5(U)	LJUN 15.0(D)	LJUN 15.0(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	6	18	1	11
		Hydropsyche				1
		Parapsyche				
		Potamyia				
		Sympitopsyche	28	29		2
	Hydroptilidae	*Leucotrichia*		1		
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*				
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*		1		
Amphipoda	Gammaridae	*Gammarus*	50	67		
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*				
Pelecypoda	Sphaeridae	*Pisidium*				

Table A3. Biological Data—Continued

Order	Family	Genus	LJUN 19.4(D)	LJUN 19.4(U)	LJUN 29.6(D)	LJUN 29.6(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus				
		Ordobrevia				
		Stenelmis	2	9		
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*	4		2	4
Diptera	Athericidae	*Atherix*	1	8		
	Chironomidae		11	25	75	27
	Empididae	*Hemerodromia*	2	2		1
		Rhamphomyia				
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*	12	11		7
		Hexatoma				
		Tipula				1
Ephemeroptera	Baetidae	*Baetis*	3	3		
		Callibaetis				
		Centroptilum				1
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*	4	4		
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				5
		Stenonema	6	19		1
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*	2	1		2
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*		2		
		Nigronia	1	1		
	Sialidae	*Sialis*				2
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				1
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*	1			

Table A3. Biological Data—Continued

Order	Family	Genus	LJUN 19.4(D)	LJUN 19.4(U)	LJUN 29.6(D)	LJUN 29.6(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	19	16	2	7
		Hydropsyche	33	13	14	4
		Parapsyche				
		Potamyia				
		Sympitopsyche	20	10	16	3
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*				
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Amphipoda	Gammaridae	*Gammarus*			4	5
Decapoda	Cambaridae	*Orconectes*				5
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*			32	17
Pelecypoda	Sphaeridae	*Pisidium*				1

Table A3. Biological Data—Continued

Order	Family	Genus	LJUN 19.4(D)	LJUN 19.4(U)	LJUN 29.6(D)	LJUN 29.6(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus				
		Ordobrevia				
		Stenelmis	2	9		
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*	4		2	4
Diptera	Athericidae	*Atherix*	1	8		
	Chironomidae		11	25	75	27
	Empididae	*Hemerodromia*	2	2		1
		Rhamphomyia				
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*	12	11		7
		Hexatoma				
		Tipula				1
Ephemeroptera	Baetidae	*Baetis*	3	3		
		Callibaetis				
		Centroptilum				1
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*	4	4		
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				5
		Stenonema	6	19		1
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*	2	1		2
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*		2		
		Nigronia	1	1		
	Sialidae	*Sialis*				2
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				1
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*	1			

Table A3. Biological Data—Continued

Order	Family	Genus	LJUN 19.4(D)	LJUN 19.4(U)	LJUN 29.6(D)	LJUN 29.6(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*	19	16	2	7
		Hydropsyche	33	13	14	4
		Parapsyche				
		Potamyia				
		Sympitopsyche	20	10	16	3
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*				
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				
Amphipoda	Gammaridae	*Gammarus*			4	5
Decapoda	Cambaridae	*Orconectes*				5
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*			32	17
Pelecypoda	Sphaeridae	*Pisidium*				1

Table A3. Biological Data—Continued

Order	Family	Genus	RAYS(D)	RAYS(U)	RAYS 42.8(D)	RAYS 42.8(U)
Coleoptera	Elmidae	*Gonielmis*				
		Macronychus				
		Optioservus		1		3
		Ordobrevia				4
		Stenelmis	14	18	3	39
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*	1	26	2	2
Diptera	Athericidae	*Atherix*	1			
	Chironomidae		6	11	6	15
	Empididae	*Hemerodromia*				
		Rhamphomyia				
	Simulidae	*Simulium*				
	Tipulidae	*Antocha*				1
		Hexatoma				
		Tipula				
Ephemeroptera	Baetidae	*Baetis*			1	6
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*		5	1	
	Ephemerellidae	*Eurylophella*				3
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*			1	1
		Leucrocuta				
		Stenacron		1		10
		Stenonema	4	13		5
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*	16	14		2
	Polymitarcidae	*Ephoron*				2
	Potamanthidae	*Potamanthus*			1	3
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*	10			
		Nigronia				
	Sialidae	*Sialis*				2
Odonata	Coenagrionidae	*Argia*		2		
	Gomphidae	*Arigomphus*				
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*				
	Peltoperlidae	*Peltoperla*				
	Perlidae	*Acroneuria*				
		Neoperla				
		Paragnetina				
		Perlesta				
		Phasganophora	1			3
	Pteronarcidae	*Pteronarcys*				

Table A3. Biological Data—Continued

Order	Family	Genus	RAYS(D)	RAYS(U)	RAYS 42.8(D)	RAYS 42.8(U)
Trichoptera	Brachycentridae	*Brachycentrus*				1
	Glossosomatidae	*Agapetus*				2
	Hydropsychidae	*Cheumatopsyche*	32	17	1	3
		Hydropsyche	12			8
		Parapsyche				
		Potamyia				
		Sympitopsyche	6	7		1
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				2
	Philopotamidae	*Chimarra*				
		Dolophilodes				
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				
	Rhyacophilidae	*Rhyacophila*				2
Amphipoda	Gammaridae	*Gammarus*				
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*				
Pelecypoda	Sphaeridae	*Pisidium*				1

Table A3. Biological Data—Continued

Order	Family	Genus	SHUP(D)	SHUP(U)	TRTR(D)	TRTR(U)
Coleoptera	Elmidae	*Gonielmis*			1	
		Macronychus				
		Optioservus			1	
		Ordobrevia				
		Stenelmis			1	
	Gyrinidae	*Dineutis*				
	Psephenidae	*Psephenus*				
Diptera	Athericidae	*Atherix*				
	Chironomidae		23	19	3	1
	Empididae	*Hemerodromia*				
		Rhamphomyia				
	Simulidae	*Simulium*				1
	Tipulidae	*Antocha*			11	
		Hexatoma				1
		Tipula	3	4		
Ephemeroptera	Baetidae	*Baetis*			10	
		Callibaetis				
		Centroptilum				
		Heterocloeon				
		Pseudocloeon				
	Caenidae	*Caenis*				
	Ephemerellidae	*Eurylophella*				
		Serratella				
	Ephemeridae	*Ephemera*				
	Heptageniidae	*Heptagenia*				
		Leucrocuta				
		Stenacron				
		Stenonema			2	12
	Leptophlebidae	*Leptophlebia*				
	Oligoneuriidae	*Isonychia*		1		2
	Polymitarcidae	*Ephoron*				
	Potamanthidae	*Potamanthus*				
	Tricorythidae	*Tricorythodes*				
Hemiptera	Gerridae	*Metrobates*				
	Veliidae	*Rhagovelia*				
Megaloptera	Corydalidae	*Corydalus*				
		Nigronia		1	4	4
	Sialidae	*Sialis*		1		
Odonata	Coenagrionidae	*Argia*				
	Gomphidae	*Arigomphus*				1
		Stylogomphus				
		Erpentogomphus				
Plecoptera	Leuctridae	*Leuctra*			1	2
	Peltoperlidae	*Peltoperla*				2
	Perlidae	*Acroneuria*				9
		Neoperla				
		Paragnetina				
		Perlesta				
		Phasganophora				
	Pteronarcidae	*Pteronarcys*			1	

Table A3. Biological Data—Continued

Order	Family	Genus	SHUP(D)	SHUP(U)	TRTR(D)	TRTR(U)
Trichoptera	Brachycentridae	*Brachycentrus*				
	Glossosomatidae	*Agapetus*				
	Hydropsychidae	*Cheumatopsyche*			11	16
		Hydropsyche	10		29	
		Parapsyche		43	7	
		Potamyia				
		Sympitopsyche			1	3
	Hydroptilidae	*Leucotrichia*				
	Lepidostomatidae	*Lepidostoma*				
	Philopotamidae	*Chimarra*				1
		Dolophilodes				21
	Polycentropodidae	*Neureclipsis*				
		Polycentropus				1
	Rhyacophilidae	*Rhyacophila*				
Amphipoda	Gammaridae	*Gammarus*				
Decapoda	Cambaridae	*Orconectes*				
Gastropoda	Lymnaeidae	*Lymnaea*				
Isopoda	Asellidae	*Asellus*				
Pelecypoda	Sphaeridae	*Pisidium*				

Appendix B
Chlorine Demand Data From Sample Sites in the Juniata Subbasin

Sample Site	Initial TRC of Stream Sample (Undosed TRC Reading)	Stream Sample Dose	Sample TRC at 10 Minutes	Sample TRC at 15 Minutes	Duplicate Sample Dose	Duplicate TRC at 10 Minutes	Duplicate TRC at 15 Minutes	Chlorine Demand of Sample	Chlorine Demand of Duplicate	Average Chlorine Demand	20% of Average Chlorine Demand	QA Chlorine Range	
												Lower Limit	Upper Limit
AUGH 0.4	0.02	0.92	0.21	0.18	0.92	0.19	0.15	0.76	0.79	0.78	0.16	0.62	0.93
AUGH 17.2	0.05	0.99	0.20	0.17	0.99	0.24	0.19	0.87	0.85	0.86	0.17	0.69	1.03
BEAV 0.1	0.04	1.13	0.49	0.41	1.13	0.49	0.45	0.76	0.72	0.74	0.15	0.59	0.89
BEAV	0.04	1.14	0.41	0.38	1.14	0.46	0.41	0.80	0.77	0.79	0.16	0.63	0.94
BEAV 4.0	0.03	1.13	0.36	0.32	1.13	0.27	0.32	0.84	0.84	0.84	0.17	0.67	1.01
BLGP 0.4	0.03	1.13	0.60	0.55	1.13	0.59	0.53	0.61	0.64	0.62	0.12	0.50	0.74
BLLG 0.9	0.02	0.92	0.30	0.21	0.92	0.30	0.28	0.73	0.66	0.70	0.14	0.56	0.83
BLLG 4.6	0.01	1.08	0.30	0.21	1.08	0.31	0.25	0.88	0.84	0.86	0.17	0.69	1.03
BOBS 0.9	0.03	1.15	0.52	0.64	1.15	0.42	0.54	0.54	0.64	0.59	0.12	0.47	0.71
BOBS 11.4	0.02	0.84	0.56	0.51	0.84	0.51	0.45	0.35	0.41	0.38	0.08	0.30	0.46
BRUS 0.1	0.03	1.13	0.32	0.27	1.13	0.39	0.25	0.89	0.91	0.90	0.18	0.72	1.08
BSPR	0.04	1.18	0.91	0.85	1.18	0.91	0.89	0.37	0.33	0.35	0.07	0.28	0.42
BUFF 0.4	0.04	1.00	0.38	0.32	1.00	0.41	0.34	0.72	0.70	0.71	0.14	0.57	0.85
BUFF 14.6	0.06	1.00	0.50	0.42	1.00	0.51	0.41	0.64	0.65	0.65	0.13	0.52	0.77
CLOV 0.1	0.06	1.13	0.42	0.33	1.13	0.50	0.41	0.86	0.78	0.82	0.16	0.66	0.98
COCO 0.2	0.04	1.00	0.52	0.42	1.00	0.51	0.40	0.62	0.64	0.63	0.13	0.50	0.76
COCO 9.6	0.02	1.00	0.47	0.38	1.00	0.49	0.40	0.64	0.62	0.63	0.13	0.50	0.76
DELA 0.2	0.00	0.92	0.57	0.51	0.92	0.63	0.55	0.41	0.45	0.43	0.09	0.34	0.52
DUNN 0.1	0.03	1.15	0.67	0.62	1.15	0.69	0.66	0.56	0.52	0.54	0.11	0.43	0.65
DUNN 9.9	0.06	0.84	0.44	0.38	0.84	0.47	0.41	0.52	0.49	0.51	0.10	0.40	0.61
ELKC 0.1	0.05	1.00	0.37	0.31	1.00	0.36	0.32	0.74	0.73	0.74	0.15	0.59	0.88
ELKC 9.8	0.05	1.00	0.53	0.33	1.00	0.50	0.31	0.72	0.74	0.73	0.15	0.58	0.88
FRNK 1.6	0.02	1.18	0.47	0.38	1.18	0.56	0.47	0.62	0.73	0.68	0.14	0.54	0.81
FRNK 18.9	0.03	1.13	0.31	0.24	1.13	0.32	0.28	0.92	0.88	0.90	0.18	0.72	1.08
FRNK 32.5	0.04	1.13	0.15	0.14	1.13	0.11	0.11	1.03	1.00	1.02	0.20	0.81	1.22
FRNK 38.1	0.04	0.84	0.22	0.21	0.84	0.30	0.28	0.67	0.60	0.64	0.13	0.51	0.76
FRNK	0.04	0.84	0.54	0.47	0.84	0.59	0.53	0.41	0.35	0.38	0.08	0.30	0.46
GTRC 2.9	0.02	0.05	0.43	0.32	1.05	0.40	0.37	0.75	0.70	0.73	0.15	0.58	0.87
HALT	0.02	0.85	0.47	0.45	0.85	0.48	0.47	0.42	0.40	0.41	0.08	0.33	0.49
HONY 0.2	0.03	0.92	0.43	0.32	0.92	0.48	0.38	0.63	0.57	0.60	0.12	0.48	0.72
JACK 2.9	0.04	1.00	0.58	0.45	1.00	0.56	0.44	0.59	0.60	0.60	0.12	0.48	0.71

Sample Site	Initial TRC of Stream Sample (Undosed TRC Reading)	Stream Sample Dose	Sample TRC at 10 Minutes	Sample TRC at 15 Minutes	Duplicate Sample Dose	Duplicate TRC at 10 Minutes	Duplicate TRC at 15 Minutes	Chlorine Demand of Sample	Chlorine Demand of Duplicate	Average Chlorine Demand	20% of Average Chlorine Demand	QA Chlorine Range	
												Lower Limit	Upper Limit
JUN 2.0	0.06	1.00	0.51	0.45	1.00	0.49	0.43	0.61	0.63	0.62	0.12	0.50	0.74
JUN17.3	0.02	1.00	0.45	0.34	1.00	0.43	0.35	0.68	0.67	0.68	0.14	0.54	0.81
JUN 34.0	0.03	1.00	0.37	0.36	1.00	0.39	0.39	0.67	0.64	0.66	0.13	0.52	0.79
JUN 47.0	0.02	0.89	0.52	0.41	0.89	0.57	0.45	0.50	0.46	0.48	0.10	0.38	0.58
JUN 84.6	0.02	0.92	0.56	0.30	0.92	0.48	0.28	0.64	0.66	0.65	0.13	0.52	0.78
KISH 0.4	0.02	0.92	0.55	0.50	0.92	0.51	0.48	0.44	0.39	0.42	0.08	0.33	0.50
KISH	0.03	0.92	0.59	0.51	0.92	0.49	0.43	0.44	0.52	0.48	0.10	0.38	0.58
KISH 5.5	0.02	0.92	0.42	0.40	0.92	0.46	0.42	0.54	0.52	0.53	0.11	0.42	0.64
KISH 15.6	0.03	0.89	0.42	0.38	0.89	0.45	0.39	0.54	0.55	0.55	0.11	0.44	0.65
LAUG 0.1	0.03	0.97		0.12	0.97	0.17	0.16	0.88	0.84	0.86	0.17	0.69	1.03
LJUN 15.0	0.03	1.01	0.35	0.29	1.01	0.44	0.37	0.75	0.67	0.71	0.14	0.57	0.85
LJUN 19.4	0.01	1.01	0.45	0.30	1.01	0.44	0.33	0.72	0.69	0.71	0.14	0.56	0.85
LJUN 29.6	0.03	1.01	0.48	0.45	1.01	0.55	0.53	0.59	0.51	0.55	0.11	0.44	0.66
NBTC 3.1	0.03	1.00	0.29	0.25	1.00	0.28	0.23	0.71	0.73	0.72	0.14	0.58	0.86
RAYS	0.03	0.85	0.76	0.71	0.85	0.64	0.62	0.17	0.26	0.22	0.04	0.17	0.26
RAYS 4.6	0.02	1.08	0.55	0.59	1.08	0.57	0.52	0.51	0.58	0.55	0.11	0.44	0.65
RAYS 42.8	0.01	1.05	0.65	0.56	1.05	0.85	0.60	0.50	0.46	0.48	0.10	0.38	0.58
RAYS 54.1	0.03	1.05	0.44	0.40	1.05	0.53	0.45	0.68	0.63	0.66	0.13	0.52	0.79
RAYS 80.5	0.03	1.15	0.46	0.37	1.15	0.56	0.47	0.81	0.71	0.76	0.15	0.61	0.91
RAYS 103	0.06	0.84	0.32	0.26	0.84	0.31	0.29	0.64	0.61	0.63	0.13	0.50	0.75
SBEC 1.4	0.02	1.01	0.47	0.43	1.01	0.63	0.53	0.60	0.50	0.55	0.11	0.44	0.66
SHAD 4.3	0.02	1.08	0.32	0.32	1.08	0.34	0.29	0.78	0.81	0.80	0.16	0.64	0.95
SHUP	0.02	1.10	0.97	0.99	1.10	1.04	1.04	0.13	0.08	0.11	0.02	0.08	0.13
SIDE 0.1	0.04	0.99	0.26	0.22	0.99	0.26	0.21	0.81	0.82	0.82	0.16	0.65	0.98
6MIL 0.2*	0.02	1.05	0.69	0.62	1.05	0.64	0.60	0.45	0.47	0.46	0.09	0.37	0.55
SPRU 1.0	0.02	1.18	0.69	0.81	1.18	0.67	0.72	0.39	0.48	0.44	0.09	0.35	0.52
SPRU 10.6	0.03	1.18	0.54	0.49	1.18	0.59	0.54	0.72	0.67	0.70	0.14	0.56	0.83
STST 1.0	0.03	1.08	0.30	0.25	1.08	0.30	0.28	0.86	0.83	0.85	0.17	0.68	1.01
STST 26.8.	0.03	1.05	0.57	0.54	1.05	0.53	0.48	0.54	0.60	0.57	0.11	0.46	0.68
TRTR*	0.04	1.10	1.05	1.01	1.10	1.06	1.01	0.13	0.13	0.13	0.03	0.10	0.16

Sample Site	Initial TRC of Stream Sample (Undosed TRC Reading)	Stream Sample Dose	Sample TRC at 10 Minutes	Sample TRC at 15 Minutes	Duplicate Sample Dose	Duplicate TRC at 10 Minutes	Duplicate TRC at 15 Minutes	Chlorine Demand of Sample	Chlorine Demand of Duplicate	Average Chlorine Demand	20% of Average Chlorine Demand	QA Chlorine Range	
												Lower Limit	Upper Limit
TSPC 0.1	0.08	0.99	0.35	0.30	0.99	0.32	0.25	0.77	0.82	0.80	0.16	0.64	0.95
TUSC 0.6	0.05	1.00	0.39	0.30	1.00	0.42	0.33	0.75	0.72	0.74	0.15	0.59	0.88
TUSC 22.5	0.03	1.00	0.36	0.32	1.00	0.37	0.32	0.62	0.62	0.62	0.12	0.50	0.74
TUSC 39.3	0.04	1.00	0.29	0.24	1.00	0.31	0.27	0.75	0.72	0.74	0.15	0.59	0.88
WILL 0.4	0.02	1.00	0.47	0.40	1.00	0.46	0.38	0.52	0.54	0.53	0.11	0.42	0.64
YELL 3.5	0.03	1.05	0.51	0.38	1.05	0.59	0.46	0.70	0.62	0.66	0.13	0.53	0.79

* Not in Juniata Subbasin

Appendix C
Fish Community Data From Trout Stocked Fisheries in the Juniata Subbasin

Family	Common Name	Species	BEAV	BLGP	CLER	DECK	DOER	FRNK1	FRNK2	IMLR	LAUR
Salmonidae	Rainbow trout	*Oncorhynchus gairdneri*				2					
	Brown trout	*Salmo trutta*		45	2	9	3	17	5		4
	Brook trout	*Salvelinus fontinalis*									7
Esocidae	Chain pickerel	*Esox niger*			1						
Cyprinidae	Central stoneroller	*Campostoma anomalum*	14	17	16		5		318	25	
	Carp	*Cyprinus carpio*						3			
	Silverjaw minnow	*Ericymba buccata*								6	
	Cutlips minnow	*Exoglossum maxillingua*		27	4	15	12	7	27		4
	River chub	*Nocomis micropogon*							6		
	Common shiner	*Notropis cornutus*					11		46		
	Spottail shiner	*Notropis hudsonius*	12		20		11	17	15	17	
	Rosyface shiner	*Notropis rubellus*							6		
	Bluntnose minnow	*Pimephales notatus*					21			14	
	Blacknose dace	*Rhinichthys atratulus*	55	237	18	110	28		35	33	49
	Longnose dace	*Rhinichthys cataractae*	11	25	5		9		15	7	8
	Creek chub	*Semotilus atromaculatus*	33	47	5	8	2		11	15	15
	Fallfish	*Semotilus corporalis*			19			11		5	
Catostomidae	White sucker	*Catostomus commersoni*	108	10	15	17	30	18	23	62	4
	Northern hogsucker	*Hypentelium nigricans*		8	8			5	4	4	9
Ictaluridae	Margined madtom	*Noturus insignis*		12	3		3		9		
Cyprinodontidae	Banded killifish	*Fundulus diaphanus*					3				
Centrarchidae	Rock bass	*Ambloplites rupestris*			27		24	3	2	21	
	Redbreast sunfish	*Lepomis auritus*			1			1		2	
	Pumpkinseed	*Lepomis gibbosus*									
	Bluegill	*Lepomis macrochirus*				6				2	
	Smallmouth bass	*Micropterus dolomieui*			11			7	1		
	Largemouth bass	*Micropterus salmoides*	2								
Percidae	Greenside darter	*Etheostoma blennioides*			12		10	6		13	
	Tessellated darter	*Etheostoma olmstedi*	2		1		22	3	9	2	
	Banded darter	*Etheostoma zonale*									
Cottidae	Mottled sculpin	*Cottus bairdi*			21	19				9	
		Total	237	428	189	186	194	98	532	237	100
		Number of Species	8	9	18	8	15	12	16	16	8

Family	Common Name	Species	LJUN	LLST	LOST1	LOST2	RAYS	UTLC
Salmonidae	Rainbow trout	*Oncorhynchus gairdneri*						
	Brown trout	*Salmo trutta*	4		7	12	1	
	Brook trout	*Salvelinus fontinalis*						
Esocidae	Chain pickerel	*Esox niger*					1	2
Cyprinidae	Central stoneroller	*Campostoma anomalum*	11		19	37	54	
	Carp	*Cyprinus carpio*						
	Silverjaw minnow	*Ericymba buccata*					7	
	Cutlips minnow	*Exoglossum maxillingua*	32	2	7	7	7	
	River chub	*Nocomis micropogon*	16		1	6	15	
	Common shiner	*Notropis cornutus*	14	3	31	8	10	
	Spottail shiner	*Notropis hudsonius*	19	39	3	3	8	
	Rosyface shiner	*Notropis rubellus*					18	
	Bluntnose minnow	*Pimephales notatus*		35		12	13	
	Blacknose dace	*Rhinichthys atratulus*	102				13	6
	Longnose dace	*Rhinichthys cataractae*	122	12	3		11	
	Creek chub	*Semotilus atromaculatus*		4				3
	Fallfish	*Semotilus corporalis*		1	13	17	64	
Catostomidae	White sucker	*Catostomus commersoni*	179	50	14	6	36	1
	Northern hogsucker	*Hypentelium nigricans*	7		2	10	17	
Ictaluridae	Margined madtom	*Noturus insignis*		1	2			
Cyprinodontidae	Banded killifish	*Fundulus diaphanus*		32				
Centrarchidae	Rock bass	*Ambloplites rupestris*	15	6	13	17	11	
	Redbreast sunfish	*Lepomis auritus*		3	1			
	Pumpkinseed	*Lepomis gibbosus*		1				
	Bluegill	*Lepomis macrochirus*	2	4	1			
	Smallmouth bass	*Micropterus dolomieui*			3	5	14	
	Largemouth bass	*Micropterus salmoides*						
Percidae	Greenside darter	*Etheostoma blennioides*	1	1	3	4	11	
	Tessellated darter	*Etheostoma olmstedi*	2	2		2		2
	Banded darter	*Etheostoma zonale*		1	1			
Cottidae	Mottled sculpin	*Cottus bairdi*					32	
		Total	**526**	**197**	**124**	**146**	**343**	**14**
		Number of Species	**14**	**17**	**17**	**14**	**19**	**5**